

# Profiles Of Phonological Awareness Skills In Young Children With Autism Spectrum Disorders, Language Impairment, And Their Typically Developing Peers

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## Abstract

This study aimed to investigate the profiles of phonological awareness skills in young children with autism spectrum disorders, language impairment, and their typically developing peers. 29 age-matched TD, 18 children in the group of children with ASD, and 14 children with LI are the participants in this study. To achieve the goal of this study, mean [Standard Deviation], ANOVA, and multiple comparisons were used. Each PA task comprised 5 test items. All words that composed the PA tasks are familiar to and commonly used among young children. The PA tasks here were chosen according to variations in the phonological unit involved (rhymes, syllables, and phonemes) and their cognitive demand (detection of similarities or differences, segmentation, blending, and elision). Children with ASD and LI score below TD children in all PA tasks (Rhyme detection task, Syllable blending task, Syllable segmentation task, Phoneme blending task, Phoneme elision task). There are statistically significant differences at the 0.05 level in the total score of PA that can be attributed to the type of group. The difference is in favor of TD children.

**Keywords:** phonological awareness skills, young children with autism spectrum disorders, language impairment, typically developing peers

## Introduction

Phonological awareness (PA) is the ability to manipulate linguistic sound allowing words to be analyzed into syllables, (Eissa, 2014) and their phonemic structure, (Khalik, 2014) and thus literacy, which begins in preschool (Mohammed & Mostafa, 2012), and continues until the third grade and beyond, (Eissa, 2014) and is related to intelligence, vocabulary knowledge, and the social and economic status of the individual (Sawi, 2013). The ability to manipulate large units of sound emerges prior to the ability to manipulate smaller units of sound (Carroll et al., 2003).

PA forms the basis for the writing process, as it can observe how

letters relate to sounds that can be written in a certain way, and provides the ability to pronounce and read new words (Eissa, 2015a), in addition to understanding the principle of the alphabet; it states that letters are represented systematically using sounds. The awareness of the phonological structure of a word helps children to draw connections between the spoken form of a word and its written representation (Eissa, 2017).

Children exhibit their knowledge of PA initially by manipulating larger units of sound (e.g., words) and then progressing until they are also able to perform tasks that require parsing words at the level of the phoneme (Anthony & Lonigan, 2004). Children are commonly asked to perform PA tasks during preschool and

the early elementary grades that focus on rhyming (e.g., Anthony & Lonigan, 2004), as well as syllable and sound blending and segmentation (Lonigan et al., 2009).

Before children start learning words, they distinguish sounds and their importance, and then learn to produce them and decode the sound system of the ambient language (Herschensohn, 2007). Children's phonological development follows a clear pattern from awareness of syllables to awareness of rhythms and individual sounds or phonemes within syllables (Treiman & Zukowski, 1996).

It should be noted that PA is an important and necessary necessity of the educational process. It is a primary factor underlying later reading abilities (Dydia et al., 2017). In learning to read, a child must be aware that words are made up of sounds and that these sounds are represented by letters and letter combinations.

This is called the alphabetic principle and is an important conceptual achievement for children in the early stages of learning to read (Adams, 1992).

Phonological awareness is important because it helps children build skills such as counting syllables, sound-matching, blending syllables, and adding or subtracting prefixes and suffixes. These skills help children's reading development recognize spoken sounds and words (Eissa, 2017). Without PA, the student loses his ability to write or read. Because he will not be able to understand what sounds represent, recognize and identify them, and fragment them into words, which will negatively affect his academic performance (Eissa, 2017a).

PA in children with ASD

ASD is a neurodevelopmental disorder

that is typically recognized during the second year of life and is defined by two main categories of criteria: social communication deficits and repetitive and stereotyped behaviors (APA, 2013).

Individuals with ASD represent a heterogeneous group that varies greatly in cognitive, linguistic, and behavioral functioning. Children with ASD are characterized by a delay in language acquisition (Eissa, 2014, 2015b, 2016, 2017b, 2018a). They have problems in the structural language (i.e., semantics, syntax, morphology, phonology) (Eissa, 2018b).

There is also some evidence that children with ASD's performance on emergent-literacy skills are related to their deficits in language, communication, and social skills (Davidson & Ellis, 2014). Children with ASD had significantly poorer language skills than their TD peers. This made researchers explore the association between language skills and PA performance. For example, the data from Befi-Lopes et al. (2022) indicated a strong correlation between language age and phonological awareness skills in children with language developmental disorders. A strong correlation between syllabic awareness and linguistic age was found as well. In addition, phonemic awareness was correlated to their chronological age. All correlation tests were confirmed by regression analysis.

Previous studies of alphabetic writing systems have supported the close relationship between PA and word reading (e.g., Ziegler, 2005) since good PA helps readers to make a fine-grained phonological segmentation at the phoneme level and convert letter(s) into speech sound(s) (Tseng et al., 2022).

PA in children with LI

Children with LI consistently demonstrate delays in phonological awareness (PA), alphabet knowledge

(AK), print awareness, and emergent writing (Pavelko et al., 2018). LI is defined as impaired understanding and use of spoken language without concomitant physical, neurological, or cognitive deficits (Leonard & Deevy, 2006).

Children with LI frequently have poorer emergent-literacy skills relative to their TD peers (Justice et al., 2015). Those children are vulnerable to impairments in their literary-skill development (Boudreau & Hedberg, 1999).

### Study Purpose

This study aimed to investigate the profiles of phonological awareness skills in young children with autism spectrum disorders, language impairment, and their typically developing peers.

### Study Questions

- 1- What are the profiles of phonological awareness skills in young children with autism spectrum disorders, language impairment, and their typically developing peers?
- 2- Do children with ASD demonstrate phonological awareness skills profiles similar to age-matched, TD children? It was anticipated that children with autism would perform below TD children in PA based on the research reported by Heimann et al. (1995) who pointed to poor performance on measures of PA by children with ASD.
- 3- Do children with LI demonstrate phonological awareness profiles similar to age-matched, TD children? It was anticipated that PA is less developed for children

with LI than for TD children of the same age

### Method

#### Participants

29 age-matched TD, 18 children in the group of children with ASD, and 14 children with LI are the Participants in this study. Criteria for the age-matched TD sample were as follows: (a) had a nonverbal IQ score at the beginning of preschool of 80 or above (on the Kaufmann Brief Intelligence Test (KBIT; Kaufman, 1990), (b) did not have any developmental disabilities and (c) be at least 4 years of age and enrolled in formal schooling. As for children in the group of children with ASD, the criteria to be included were as follows: (a) had a nonverbal IQ score at the beginning of preschool of 80 or above (on the Kaufmann Brief Intelligence Test (KBIT; Kaufman, 1990), (b) were able to respond to the examiner and (c) be at least 4 years of age and enrolled in formal schooling. As for children in the LI sample, the criteria to be included were as follows: (a) had a nonverbal IQ score at the beginning of preschool of 80 or above (on the Kaufmann Brief Intelligence Test (KBIT; Kaufman, 1990), (b) did not have any other known diagnoses (e.g. Fragile X syndrome), and (c) be at least 4 years of age and enrolled in formal schooling

#### Instruments

##### Phonological awareness tasks

Each PA task comprised 5 test items. All words that composed the PA tasks are familiar to and commonly used among young children. The PA tasks here were chosen according to variations in the phonological unit involved (rhymes, syllables, and phonemes) and their cognitive demand (detection of similarities or differences, segmentation, blending, and elision) (Justi et al., 2021).

PA tasks were as follows (Adapted from Justi et al., 2021):

-Rhyme detection task: This task requires the child to say which of three words presented orally and the matched figures rhyme with the final sound. Cronbach's alpha reliability coefficient for this task was .82 .

-Syllable blending task: In this task, each target word is pronounced, including a 1-second pause between each syllable (/win/; /dow/), and the child is asked to mentally join the syllables and to say the resulting word (/window/). Cronbach's alpha reliability coefficient for this task was .87 .

-Syllable segmentation task: This task requires the child to segment the words spoken by the experimenter (for example: /cat/) into their respective syllables (/ca/; /t/), using figures to help the child in this task. Cronbach's alpha reliability coefficient for this task was .86 .

-Phoneme blending task: In this task, isolated phonemes are presented (/s/; /p/; /i/;

/d/; /e/; /r/), and the child is asked to mentally join them and say the resulting word (/spider/). Cronbach's alpha reliability coefficient for this task was .84.

-Phoneme elision task: This task consists of orally presenting a word (for example:

/Turtle/) and requires the participant to

mentally delete a specific sound pronounced by the experimenter (for example: /T/) and say the word with the remaining sound (for example: /urtle/). Cronbach's alpha reliability coefficient for this task was .89.

### Scoring

Each response was scored as correct (1) or incorrect (0). Non-responses were also scored as incorrect (0) but recorded separately on the scoring sheet (NR5no response).

### Data Analysis

To achieve the goal of this study, Mean [Standard Deviation], ANOVA, and Multiple comparisons were used.

### Results

#### Research question 1

To answer the first research question, what are the profiles of phonological awareness skills in young children with autism spectrum disorders, language impairment, and their typically developing peers like?, further descriptive analysis of mean scores for the PA tasks (Rhyme detection task, Syllable blending task, Syllable segmentation task, Phoneme blending task, Phoneme elision task) were completed (See Table 1 for descriptive results). As shown in Table 1., children with ASD and LI score below TD children in all PA tasks (Rhyme detection task, Syllable blending task, Syllable segmentation task, Phoneme blending task, Phoneme elision task).

Table 1. Descriptive results for the PA skills variables

Measures	ASD sample (n=18)		LI sample (n=14)		TD sample (n=29)	
	M	SD	M	SD	M	SD
RDT	1.8	0.65	1.6	0.67	4.1	1.01

SBT	1.5	0.42	1.3	0.54	3.9	1.00
SST	1.7	0.49	1.5	0.71	3.8	1.03
BPT	1.3	0.43	1.00	0.73	3.7	1.00
BET	1.6	0.39	1.04	0.54	3.9	1.01

Note. RDT= Rhyme detection task, SBT= Syllable blending task, SST= Syllable segmentation task, BPT= Phoneme blending task, BET =Phoneme elision task

### Research questions 2 & 3

To answer the second and third research questions, Do children with ASD and LI demonstrate PA skills profile similar to age-matched, TD children?, a one-way ANOVA to compare groups was used. The result of the ANOVA, as shown in

table 2, shows that the F-value is less than the alpha level of 0.05. So, there are statistically significant differences at the 0.05 level in the total score of PA that can be attributed to the type of group. Table 3 shows that the difference is in favor of TD children.

Table 2. ANOVA results for the difference between the three groups

	Sum of Squares	df	Mean Square	F.	Sig.
Between Groups	18.217	3	6.072	3,21	.013 sig.
Within Groups	74.478	47	1.584		
Total	97,759	50			

Table 3. Multiple comparisons

Variables	Mean Difference	Std. Error	Sig.
TD children Vs ASD	15.43	6.45	.011
TD children Vs LI	18.37	7.75	.010
ASD Vs LI	0.662	0.659	.978

### Discussion

It is not surprising that children with autism would score below TD children. Language impairment may underlie the delayed PA skill development observed in children with LI and ASD. Children with ASD demonstrate significant oral language and communication deficits, especially in the area of semantics and vocabulary, that may influence the underlying phonological representation of words stored in the mental lexicon (Kjelgaard & Tager-Flusberg, 2001).

These findings add to a growing body of evidence that children with ASD have slower PA acquisition, as demonstrated

by poorer performance on global PA measures, compared to their TD peers (Dydia et al., 2014; Hudson et al., 2017)

As expected, TD children demonstrated developmentally appropriate PA skills on all standardized tasks for their age. The children with ASD and LI scored below

average on that standardized task. This goes in the same line with other research in the literature. These findings are consistent with previous research indicating delayed PA skill development in children with ASD (Dyenia et al., 2014; Hudson et al., 2017).

Lesley et al. (2016) indicated that recent preliminary findings suggest that some children with autism who present with more severe global language impairment may also exhibit more severe phonological difficulties.

Huiduo et al. (2020) found that the Phonological development of Putonghua-speaking children with ASD was significantly lower than that of age-matched TD children but closer to that of receptive-language-age-matched TD children.

Children with autism have reduced vocabularies relative to age-matched children (Kjelgaard & Tager-Flusberg, 2001); therefore, phonological awareness ability may be influenced by weaker or fewer phonological representations in the lexicon.

Children with ASD are thus similar to children with LI of other origins with respect to the interaction of language, phonology, and phonological awareness skills (McGee, 2006).

### Conclusion and Recommendations

Results from this study demonstrate that PA is less developed for children with ASD and LI than for TD children of the same age. That is, the findings from this research study suggest that children with ASD and LI, compared to TD children of the same age, demonstrated a continued gap in PA during an academic year. This information will be important for designing effective early interventions for children with ASD and LI.

As the preschool teachers interact with the children, in a way they conduct phonological awareness activities. Singing songs with children, using rhymes, and rhyming words, and producing words that begin with the same sound help children develop their phonological awareness skills.

The increasing number of children with a diagnosis of ASD and LI in the school system demands consistent information about the characterization of their reading abilities and the results of different intervention alternatives.

### Limitations'

This study is not without limitations. One limitation involves the unequal number of children in the three groups, with 29 age-matched TD 18 children in the group of children with ASD, and 14 children with LI. Another limitation is that the small number of children in all groups may have influenced the correlation analyses.

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